Sunny Central SC 100
Installation manual

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1 Notes on this Manual

1.1 Validity

This installation guide covers the correct installation and commissioning of type SC 100 indoor / outdoor SMA inverters.

1.2 Target Group

Only trained electricians approved by the responsible energy supply company may install and commission the inverters. The instructions assume that you, the installer, are familiar with electrical installations and know the corresponding rules and regulations.

1.3 Explanation of the Symbols Used

This symbol indicates a fact which, if ignored, could result in damage to components or personal hazard. Please read these sections especially carefully.

This symbol indicates a fact that is important for optimum operation of the product. Read these sections carefully to ensure optimum operation of your product.

This symbol indicates an example.

2 Introduction

Dear customer,

You have made a good choice in purchasing the Sunny Central solar inverter. To guarantee correct connection and reliable operation of the device, please take note of the safety and installation instructions in the following sections. The following extra documents are also available in addition to the installation guide:

- Sunny Central user manual
- Sunny Central wiring diagrams
- Installation requirements (contains views of the inverter)

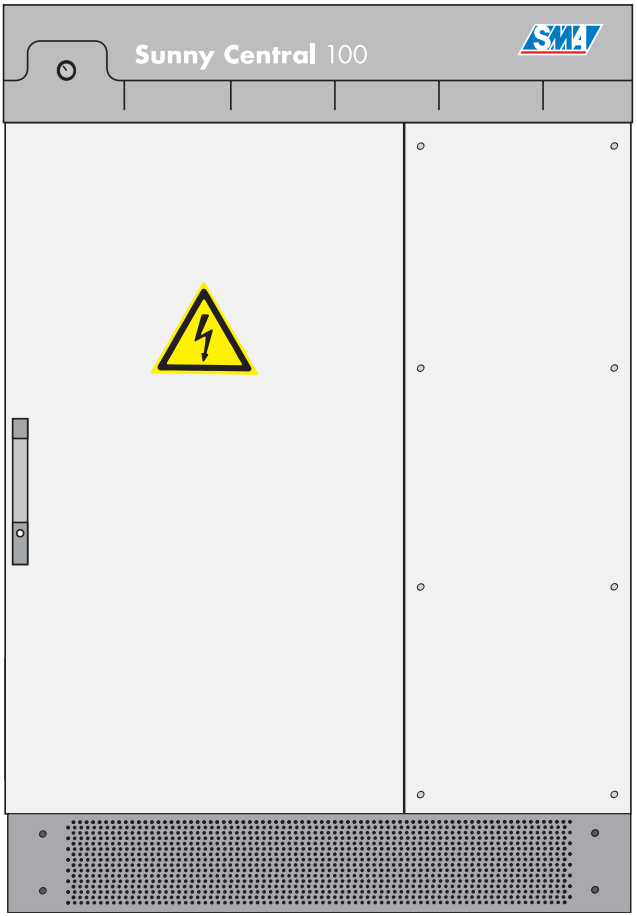


Figure 2.1: Sunny Central SC100 Indoor / Outdoor front view

3 Safety Instructions

The Sunny Central SC100 is built using the latest technology, according to recognized safety standards. Despite this, hazard to users, third parties or equipment can arise during operation or when working on the device. These hazards can be reduced to a minimum when the device is used appropriately as directed.

Faults that affect or limit the safety of the device must be immediately rectified. Unauthorized modifications and the use of spare parts not recommended by SMA Technologie AG may cause fire, material damage and electrical shock. Unauthorized personnel must not have access to the equipment.

Warning signs must always be clearly readable and immediately replaced if damaged.

3.1 Appropriate Usage

Appropriate use of the Sunny Central means following all instructions in the installation guide relating to transport, installation, electrical connection, and commissioning of the equipment.

Any deviation from the installation guide instructions is regarded as inappropriate use of the equipment. SMA Technologie AG accepts no responsibility or liability for any and all damage resulting from inappropriate use of the equipment.

Appropriate use of the equipment also entails:

- Observation of the safety instructions listed here and in the following sections
- Observation of the instructions in the Sunny Central user manual
- Observation of additional documentation for variants and options, such as grounded operation (GFDI) and the extended voltage range (EVR)
- Conformance to the device-dependent technical data

3.2 Personnel

Only qualified technical personnel may perform any and all work on the Sunny Central. "Qualified" means that the personnel must possess training relevant to the activity performed.

For commissioning and operation of the Sunny Central inverter, the personnel must be familiar with the content of the Sunny Central documentation. In particular, the safety instructions must be followed.

3.3 About this Manual

This manual was written with the greatest possible care. However, discrepancies cannot be excluded. SMA Technologie AG accepts no responsibility or liability for injury to persons, or material damage caused by mistakes in this manual.

3.4 Checking and Storage

Upon receipt of the equipment, check the packaging and the device for any possible damage and compare the contents of the delivery with the delivery documentation. In the case of damage to the device and/or unclear delivery contents, please contact SMA Technologie AG immediately (contact address is in the appendix).

The equipment may only be stored when closed, thus ensuring its interior is protected from dust and moisture.

During longer storage periods, the equipment must be kept in a dry place to prevent moisture from entering the inverter.

3.5 Transport

Only the transport methods described in the installation guide are permissible. Please note the heavy weight of the equipment and the non-central center of gravity. The center of gravity is marked on the packaging.

Danger of tipping during transport.
Follow the "Sunny Central Transport Instructions" in *Appendix A* and pay attention to the center of gravity markings on the packaging.

3.6 Installation

The information contained in the installation guide must be observed when installing the inverter. The SC 100 Indoor is designed for indoor installation, with a protection rating of IP21. The SC 100 Outdoor is designed for outdoor installation, with a protection rating of IP44/54. The device must be installed in a manner such that the proper electrical connections, adequate ventilation, and adequate fire protection are possible.

The Sunny Central SC100 Outdoor product line has been type-tested and approved for outdoor installation in accordance with the industry-standard EMC limits (EMC = Electro Magnetic Compatibility).

Please observe the additional information on installing the SC 100 Outdoor located in ***Appendix C***.

3.7 Special Hazards of Photovoltaic Systems

An active power source is connected!

Photovoltaic systems have special characteristics representing special hazards:

- An active power source is connected. This means that, depending on the operating mode, there may be voltage present, either from the photovoltaic generator and/or the Sunny Central. This is especially important to note when disconnecting particular parts of the system
- Very high DC voltages are present (no zero-crossing) which, in case of a fault or inappropriate use of fuses or plugs, may lead to arcing.
- The short-circuit current of the photovoltaic generator is only slightly more than the maximum operating current and is also dependent on the level of solar irradiation. This means that, if a short circuit occurs in the system, the existing circuit breakers are not guaranteed to switch off.
- A highly branched generator array may be difficult to disconnect if a fault develops (e.g. short circuit). We recommend the extra use of external DC circuit breakers for disconnecting the inverter and/or the DC main cables / Sunny String monitors (DC circuit breakers optionally available). One circuit breaker should be allocated to each input, and these should be located near to the Sunny Central, as described in the standard VDE 0100 part 7-712 and the VDI 6012 regulations.

3.8 Electrical Connection

The electrical connection must be performed according to the installation guide, the device connection plan and the technical data of the device.

AC Grid Connection

The customer must determine the required grid connection type for the AC grid connection (TN-C, TN-S, TT grid) and coordinate it with SMA.

Ensure the grid connection cable for grid feeding is fused at the nominal current indicated on the name plate. If the specified nominal current differs from the nominal current of the fuse plug, the fuse plug having the next highest nominal current may be used. A power switch is used for the optional load-disconnecting switch.

An external input control voltage (optional) must be fused with a circuit breaker conforming to the specifications in Appendix B (SC100 Indoor / Outdoor technical data).

SMA must be informed of the required AC grid connection type!

Lightning / Overvoltage Protection

The device has internal overvoltage protection on the DC side and, depending on the option chosen, also has lightning and/or overvoltage protection on the AC side. The desired level of protection can only be achieved when the grid connection point has a Lightning Protection Zones Concept in compliance with DIN VDE 0185-3 (DIN EN 62305 / VDE 085, part 305-3). In keeping with the Lightning Protection Zones Concept, there are lightning conductors and combined overvoltage protectors which are not included in the scope of delivery for the equipment and which must be installed at the entrance (transfer point from lightning protection zone LPZ 0 to LPZ 1).

We recommend using lightning protection for the PV generator.

A direct strike can irreparably damage the overvoltage protectors or other system components and cause additional consequential damages.

We recommend expanding the lightning and overvoltage protection for external input control voltage. Please see section 7.1.9 Lightning and Overvoltage Protection.

Emergency Shut-off

The inverter is not equipped with an external emergency shut-off switch.

An external emergency shut-off switch or the external emergency shut-off function for more than one device can be ordered as an option (emergency shut-off circuit).

The emergency shut-off circuit may only be supplied with power from a single Sunny Central.

3.9 Operation

Apart from the Sunny Central Control, there are no control elements on the device. The cabinet doors must only be opened for commissioning, maintenance and troubleshooting, as well as for data query and parameter setting. Before opening, the device must be switched off using the key switch. Please also note the following safety instructions for working on the device.

Before opening the door, the Sunny Central must be switched off using the key switch!

The Sunny Central must not be operated with the door open!

3.10 Commissioning, Maintenance and Repair

All work on the Sunny Central may only be performed when the device is safely disconnected from the PV voltage, the grid voltage, and the internal power supply, when these power sources are secured against being switched on again, and when it has been checked that the device is voltage-free. Only qualified technical personnel, who are familiar with the operation of the system, may undertake any such work.

3.11 Power Supplies

Switching on of the external power supplies

- Grid voltage for the grid feed-in
- Grid voltage for control voltage (internal power supply). There is the option of feeding it externally.
- DC voltage from the photovoltaic generator must occur in the sequence described and may only be performed when the following conditions are satisfied:
- All connections have been made according to the installation guide and the wiring diagram.
- The protective ground connection for grid feed-in and for internal power supply has been made.
- The device is switched off. This means that the Start/Stop switch is in the “Stop” position and the main switches are off.

- The Plexiglas covers are mounted, to ensure protection against accidental touching.
- The nominal voltage, frequency and the right-hand rotary field are maintained (see device technical data).
- The polarity of the DC voltage at the inputs/fuse inputs (device dependent) has been checked.
- The photovoltaic generator has been checked with an insulation test to ensure that there is no ground fault.

Figure 3.1: Sunny Central SC100 interior view

The protective ground connection must be made before the external voltage is switched on!

The nominal voltage, frequency and right-hand rotary field are maintained at the AC grid connection.

The cabinet must remain closed when connecting the supplies!

3.12 Disconnect

External insulation of the device must always occur under load-free conditions. The device must be switched off in order to do this. This means that the key switch must be in the "Stop" position.

Work on the Sunny Central may be performed only after switching off the power to the unit. The VDE regulations must be followed.

- Disconnect
- Protect against reenergizing
- Test each unit to ensure that all voltages have been removed
- Ground and short the unit if necessary (not on the DC side)
- If necessary, cover or protect against accidental contact with any voltage carrying components

The following power supplies must be isolated:

- Grid voltage for the grid feed-in
- Grid voltage for internal power supply (optional)
- DC voltage from the photovoltaic generator

Simply switching off the main AC and DC switches is not sufficient to ensure proper insulation of the device. The main switches only separate the power circuit from the grid and the photovoltaic generator.

Dangerous accidental-contact voltages can be present in the device even when the main AC and DC switches are switched off!

In case of a failure, the DC contactor(s) may carry a life-threatening DC voltage!

We recommend the extra use of external DC circuit breakers (optionally available) for disconnecting the Sunny Centrals and/or one or more DC main cables / Sunny String monitors. Even in the case of faults or fire, this allows system components to be safely isolated.

The device contains capacitors on the AC and DC sides that must discharge once the device has been switched off. After switching off, there are dangerous accidental-contact voltages present within the device for several minutes. If there is a fault in the device, these voltages may also remain present for a longer period of time. For these reasons, wait a minimum of 5 minutes after switching off before opening the device.

The discharge time of the capacitors is longer than 5 minutes.

3.13 General Information

Working on the Fans

The device is equipped with several fans for cooling. Work on the fans may only be performed after all insulation measures have been taken, in exactly the same manner as prescribed for commissioning, maintenance and repair work.

Warning: rotating fans in the inverter!

Hearing Protection

The device fans and the power unit create significant levels of operating noise. In addition to this, a fault in the device can lead to very high sound levels. For these reasons we recommend the use of hearing protection in its vicinity.

We recommend the use of ear protection when in the vicinity of the device for extended periods.

Burns

Immediately after isolating the device, depending on the operating conditions, certain components can be very hot (e.g. fuses, transformer core, sine wave filter, heatsinks etc.).

Safety gloves should always be worn when working near components that can be expected to be very hot.

We recommend that safety gloves be worn during all work on the device.

4 Transport

Only the transport methods described in the installation guide are permissible, please follow the transport requirements in **Appendix A.**

When delivered, the inverter stands on a pallet. Under standard delivery conditions, a forklift must be available. When unloading, the heavy-load markings must be observed, without exception.

4.1 Overview of Weights and Dimensions

Please note the heavy weight of the inverter. To assist with transporting, the data sheet on the dimensions and weight is contained in **Appendix B**.

The center of gravity of the cabinet unit is marked on the outside of the packaging.

Heavy weight of the cabinet unit! Danger of tipping during transport!

The cabinet must always be transported upright.

*Be sure to follow the **"Instructions for Transporting Sunny Central Inverters"** in **Appendix A**!*

4.2 Transport Possibilities

Transporting Using a Pallet Truck / Crane

The plinth panels must be unscrewed to transport the cabinet without a palette. This allows the fork of a pallet truck / forklift or crane to be inserted under the cabinet.

*Please note the Sunny Central transport requirements in **Appendix A**.*

5 Installation Requirements

For safe operation of the inverter, the installation site must satisfy the following conditions:

- Foundation (load carrying capacity)
- Inverter protection rating / EMC / sound levels
- Minimum workspace requirements (escape routes)
- Ventilation / permissible ambient temperature / air quality / humidity

5.1 Installation Site Requirements

5.1.1 Foundation

The foundation must guarantee solid and safe positioning of the inverter. It must provide the load-carrying capacity necessary to cope with the weight of the inverter. A foundation slab is required for ground-mounted installations. Pouring and dimensioning the foundation slab must be performed by the customer, see **Appendix D**.

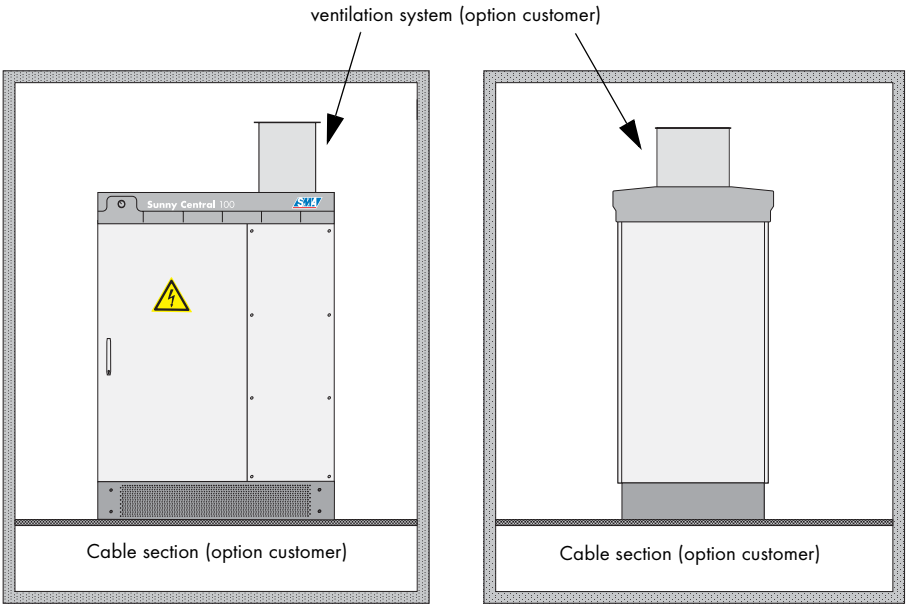


Figure 5.1: Installation of the SC100 Indoor in a building

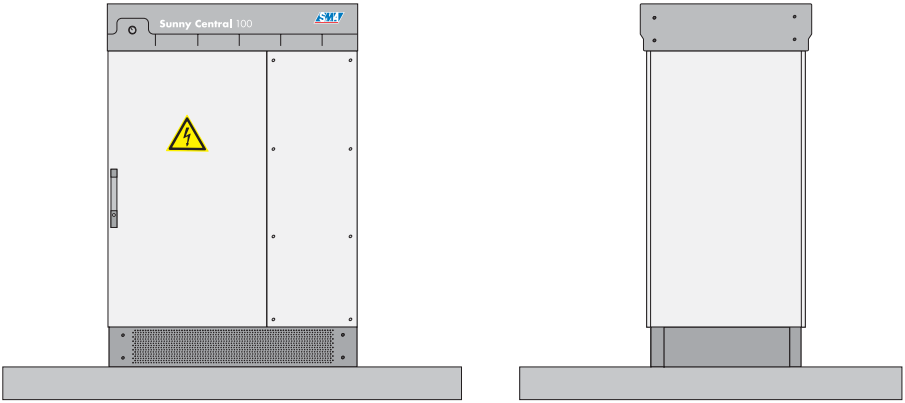


Figure 5.2: Installation of the SC100 Outdoor with concrete foundation slab

Pouring and structural inspection of the foundation slab should be performed on-site.

The inverter cabinet must be installed on a level surface. Any existing unevenness, depressions or slope must be corrected prior to installation.

When pouring the foundation, keep in mind that the cables and conduits should enter the inverter from underneath. This means that suitable conduits or cable feed-throughs should be installed prior to pouring.

The cable must be routed into the inverter from below.

The cable routing through the removable base plates in the Sunny Central is displayed in ***figure 5.3****.*

The control voltage and communication cables must be installed separately.

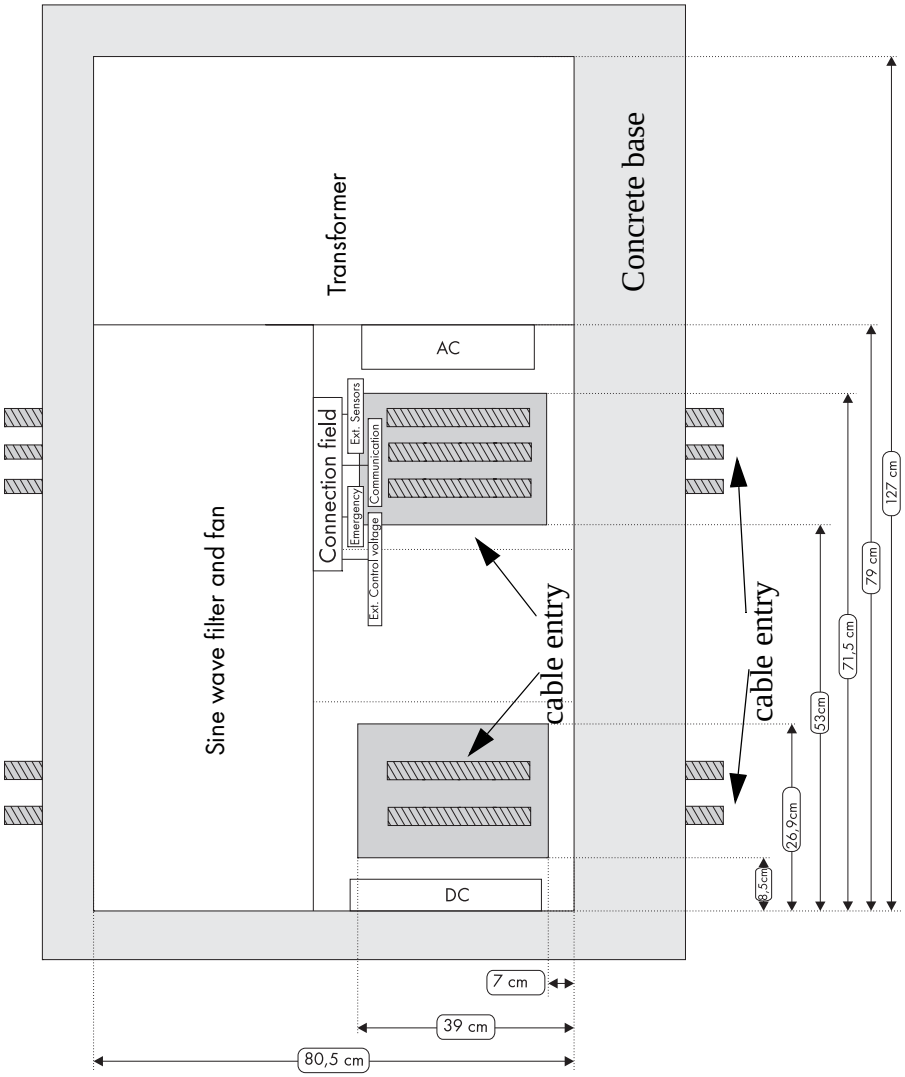


Figure 5.3: Different cable feeds from the front and from the rear; the cable must be routed into the foundation plate from below

Dimensioning the concrete foundation and cable feed pipes through the concrete foundation must be performed by the customer.

5.1.2 Minimum Workspace Requirements

When installing the inverter, appropriate clearances to stationary objects and neighboring inverters must be observed. Minimum passage widths, escape routes, and minimum clearances for optimal ventilation are to be guaranteed. The corresponding specifications are contained in **Appendix C**.

The technical diagrams with the dimensions are contained in the Sunny Central installation requirements.

Refer to the national applicable standards for installing and connecting the Sunny Central inverter. In Germany, the requirements for passage widths and escape routes in electrical operating sites and the installation of high voltage systems of up to 1000 V are regulated by DIN VDE 0100 part 729, part 731.

With fully opened cabinet doors, a minimum passage width of 500 mm (escape route) must be maintained.

To maintain the minimum passageway requirements, the cabinet doors in an inverter system with two rows of opposing cabinets may only be opened on one side at a time.

The minimum clearances and passage widths to be maintained along with the corresponding dimensions are contained in **Appendix C**.

5.1.3 Inverter Protection Rating / EMC / Sound Levels

The outdoor version of the Sunny Central SC 100 is suitable for outdoor installation according to the IP44 protection rating. The control area is enclosed from the power area and has IP54 protection rating. The indoor version of the Sunny Central SC 100 is suitable for installation in a station located in a dry, dust-reduced environment according to protection rating IP21. With regard to the EMC emissions and the noise level, the inverter is conceived for setup in an industrial environment or for outdoor installation.

5.1.4 Ventilation

Ambient Temperature / Air Quality / Humidity

To cool the inverter, the ventilation system must be free of any obstructions in order to ensure the required inlet ventilation and heat dissipation.

The specified minimum clearances in **Appendix C** must be maintained for this purpose.

For safe operation, and maximum feed-in performance, the permissible ambient temperature is between -20 and +50 °C. The rated values can be ensured at ambient temperatures of up to +40 °C.

The air required for the SC 100 Outdoor is drawn through the ventilation system on the roof of the inverter. Therefore, the corresponding device openings must be kept free and clean according to the maintenance intervals specified in the user manual. The air required for the SC 100 Indoor can either be drawn through the ventilation system on the roof of the inverter or fed directly to the inverter through an air duct that is provided by the customer.

The exhaust air (waste heat) is blown out through the front plinth panels. The exhaust air of the SC 100 Indoor is blown out through an air duct in the roof of the inverter.

If the SC 100 Outdoor is exposed to direct sunlight, the internal temperature in the inverter can increase and thus lead to a reduction in the output power. In this case, we recommend using a sun shading system or installing the device in a shaded area or under a module table. In case of existing buildings, the shaded area at the north side of the building should be used.

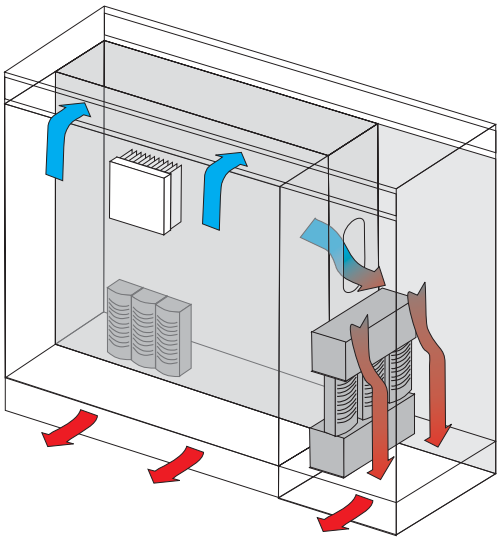


Figure 5.4: View of the ventilation concept of the SC 100 Outdoor

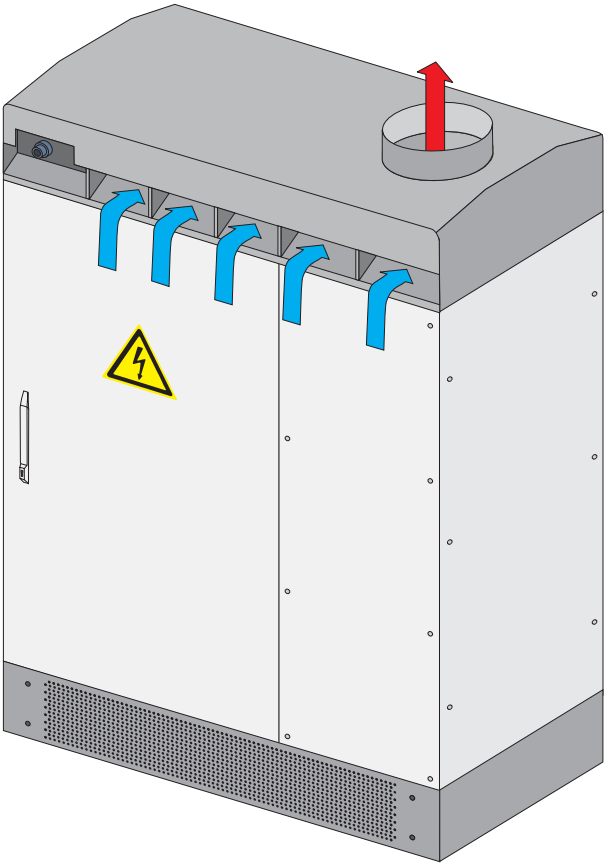


Figure 5.4: View of the ventilation concepts of the SC 100 Indoor

Install with unobstructed ventilation system!

Regular cleaning of the outer air inlets and the inner cover grid!

The device must not be installed in direct sunlight!

The device must not be installed in environments with salty air!

The inlet air for the SC 100 Outdoor must satisfy the requirements of the classifications 4S2 and 4C1, whereas the inlet air for the SC 100 Indoor must satisfy the requirements of the classifications 3S2 and 3C1L. The operation of the inverter is suited to a relative humidity of 15 to 95 %.

Please observe the requiremets for air quality, relative humidity, fresh air volume and permissible ambient temperature.

6 On-Site Inverter Installation

6.1 Mounting on the Foundation

Removing the Transport Locks

The inverter must be fixed to the foundation or foundation slab. Therefore, the respective attachment points (wall anchors, threaded bolts) must be in place before installation. A rig close to the base of the device facilitates its attachment to the foundation. The corresponding figure is found in **Appendix D**.

Attaching the inverter to the foundation or the foundation plate.

After attaching the device to the foundation, remove the transformer transport lock. This consists of an iron right-angle that is fastened to the side of the cabinet.

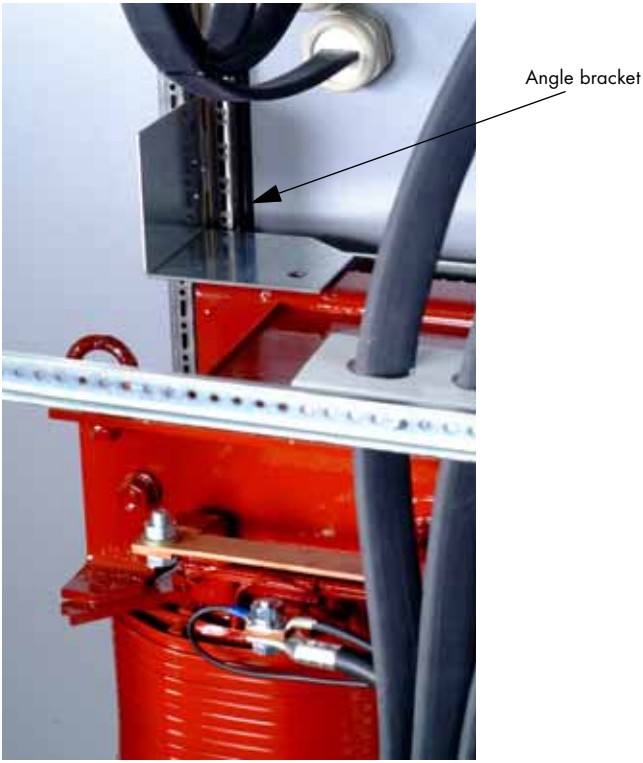


Figure 6.1: View of transformer transport lock with sidewall removed

After the cabinet has been installed, the provided grid must be mounted below the transformer using the provided wing bolts.

The grid must be mounted before the plinth panels are mounted.

Figure 6.2: Side view with transformer

7 Electrical Connection

After the inverter has been installed and mechanically attached, the electrical connection can be established.

The cables are fed from below through the socket and the base of the cabinet. To do this, the base plates in the front of the cabinet are to be opened and the cable pulled into the inside of the cabinet. The corresponding cable screw connections must be installed in the removable base plates in order to seal the cable routing and to provide strain relief for the cable. A range of various screw fitting sizes is provided for this purpose.

The device-specific wiring diagram provided must be used for establishing the connections!

7.1 External Connections

7.1.1 AC Grid Power Connections

The AC grid connection is made at the **TN-C, TN-S, TT** grid connection type, which must be provided by the customer, using a 3-phase system equipped for 400 V.

The connection terminals are located in the front chamber, on the right-hand lower area of the sidewall.

SMA must be notified of the required AC grid connection type during the project planning phase!

Cable screw connections must be installed in the base plates to provide strain relief for the AC cables!

The AC cables are connected using cable lugs on M12 bolt clamps.

The grid connection must be installed in a way such that a right-hand rotary field lies at the input of the cabinet. A left-hand rotary field will cause the frequency values to be displayed as negative values. The correct phase sequence must also be followed.

Ensure the grid connection cable is fused at the nominal current indicated on the name plate. If the specified nominal current differs from the nominal current of the fuse plug, the fuse plug having the next highest nominal current may be used.

Figure 7.1: View of the base plates for cable routing and the SC100 electrical connections

Figure 7.2: Differnet kind of AC grid connection terminals

7.1.2 AC Control Voltage Connection (Optional)

The 1 x 230 V power required for driving the internal circuits of the Sunny Central SC100 is taken internally from the grid-feed-in line of the inverter. This reduces the feed-in energy yields by the amount of power required by the inverter itself (fans, heating etc.).

The energy required for driving the Sunny Central SC100 Outdoor can be provided optionally from an external source. The connection to the control voltage supply is made 1-phase to a **TN-S grid connection**. The standard bridges in the connection terminal strip, as shown in the wiring diagram, must therefore be removed and the separate supply cable must be connected.

In doing so, please note that the external supply cable should also be protected against lightning and overvoltage. This can be ordered optionally.

The connection of an external control voltage supply is established on 3 x 2.5 mm² spring-type terminals.

When an external control voltage supply cable is connected, the lightning and overvoltage protection at this voltage input is rendered useless! See section 7.1.8 Lightning and Overvoltage Protection

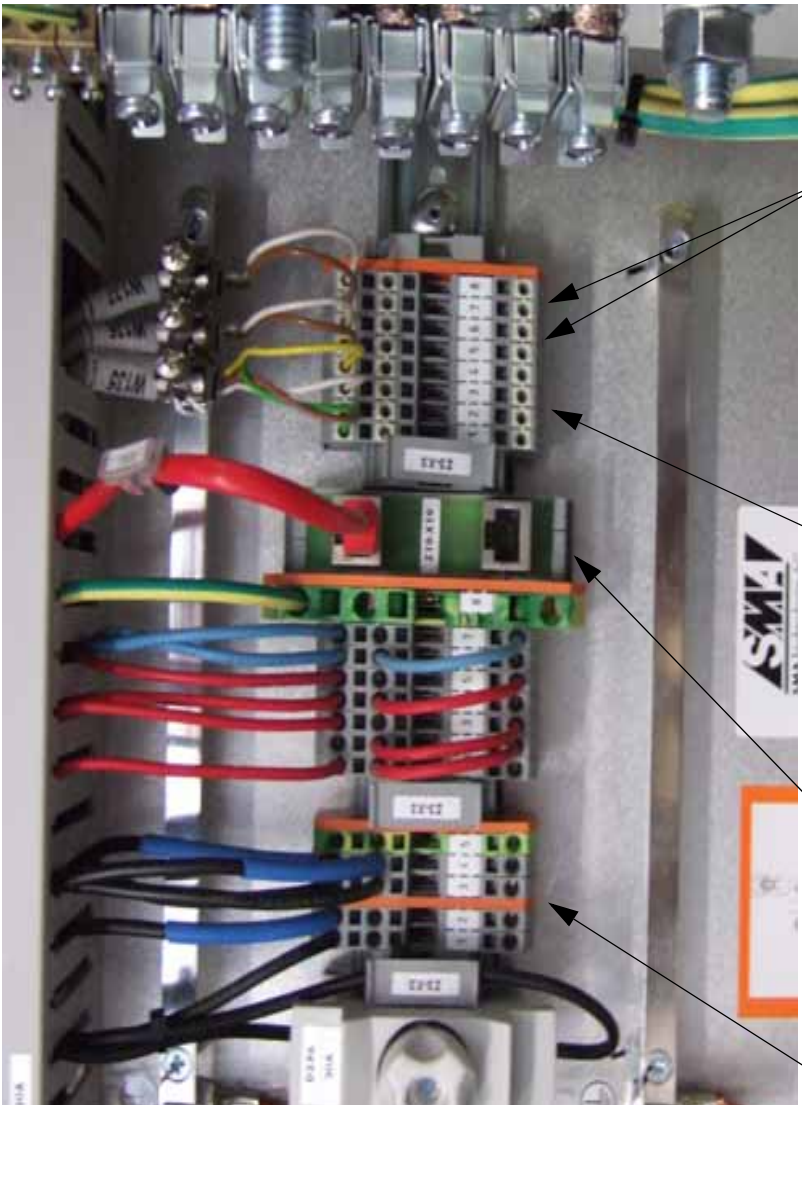


Figure 7.3: Connection terminal for external control voltage (optional), the sensor inputs and the communication

7.1.3 Handling the Connection Terminals

The following figure shows the correct method for handling the terminals used for connecting external cables to the control terminal strip. The connection terminals are designed as maintenance-free spring-loaded terminals that can be operated using a suitable screwdriver.

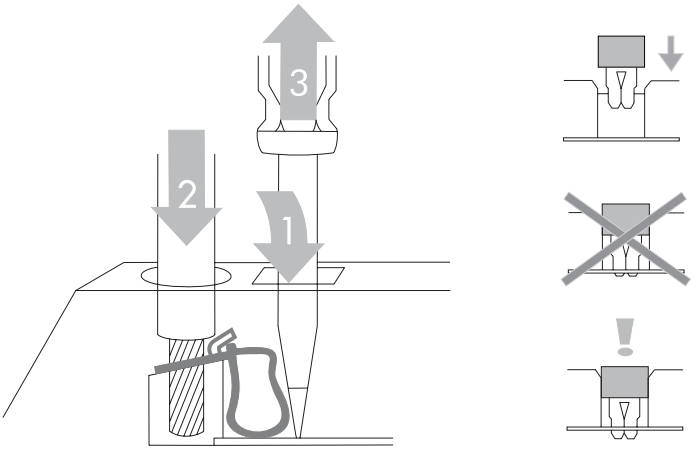


Figure 7.4: Handling the connection terminals (source: Wago)

The connections should only be made under voltage-free conditions!

7.1.4 Sensors and Digital Outputs

Two analog sensors and one PT100 temperature sensor can be connected to the Sunny Central. The connection is made in the device's connection area. Please refer to the provided wiring diagram for the signal assignment of the connection terminals.

Further information about the connection and parameterization of analog sensors is contained in the Sunny Central user manual. We recommend equipping the first sensor inputs with an overvoltage protector, available as an option. The sensors are connected directly to the overvoltage protector, see **figure 7.3.**

Please note the connection possibility of the analog sensors in four-wire or two-wire system and the required transducers, if necessary.

Please take note of the comprehensive description in the Sunny Central user manual provided.

7.1.5 Inverter Communication Connection

The device can be equipped with various interface cards (Net Piggy Back) for the communication between the inverter and a PC or modem.

The data can be transferred using the following Net Piggy Back versions:

- Analog
- ISDN
- Ethernet
- GSM (combining Net Piggy Back Ethernet + GSM router)

The data cable is connected via the **NET** interface (RJ45 socket), see **figure 7.3**.

The length of the data lines must be taken into account when planning or establishing the communication. An optimum and project-related plan for the data transfer should be coordinated with SMA.

7.1.6 Shield Contact Handling Instructions

The external signal and bus cables must be shielded. The shield must contact the shield rail, provided for this purpose, along a large surface area. Contact is achieved using the shield clamps provided in the accessories kit. The correct handling of the shield clamps is shown in the following figure. The shield clamps must only be hand-tightened, never use a screwdriver. Screwing the clamps with a screwdriver can damage the cable insulation.

Do not screw in the shield clamps with a screwdriver, hand-tighten only.

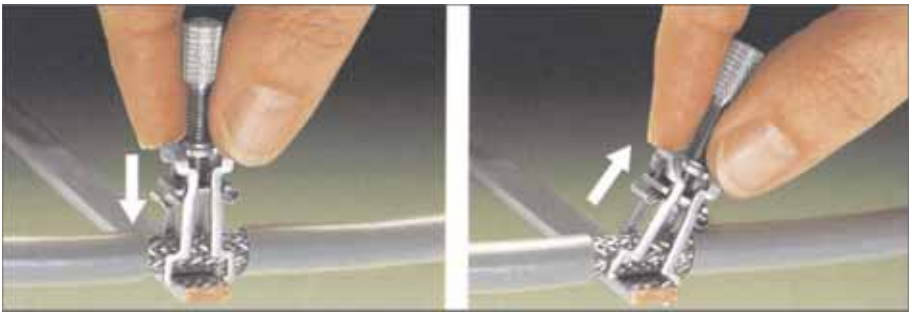


Figure 7.5: Handling the shield clamps (source: Wago)

7.1.7 Sunny String Monitor Communication Connection

The communication between the Sunny Central Control unit in the inverter and the Sunny String Monitors equipped with integrated string current monitoring is conducted via RS485 data line. The data cable is connected directly to the Hub in the Sunny Central and afterwards to the Sunny Central Control, see **figure 7.6**.

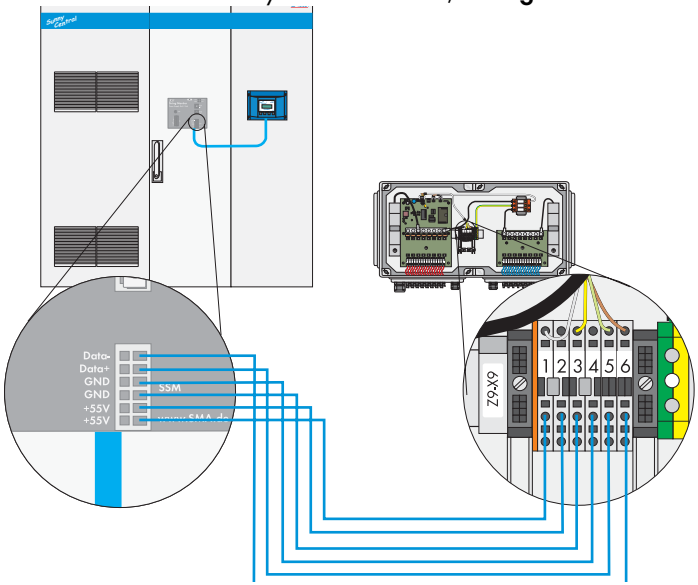


Figure 7.6: Connection of the data line to the Sunny Central

It is essential that you follow the instructions of the comprehensive description in the Sunny String Monitor user manual provided and in the wiring help „Connection of the communication in the SSM".

7.1.8 Lightning and / or Overvoltage Protection

The Sunny Central SC100 Outdoor is equipped with internal lightning and overvoltage protection. In this case, the AC/DC connection and the RS485 interface for connecting the Sunny String Monitors is protected. Optionally, the analog signal input of an external temperature sensor (see wiring diagram) can also be protected against lightning and overvoltage.

If the control voltage is supplied by an external cable, the existing overvoltage protection must be expanded. We therefore also recommend equipping the control voltage input with combined overvoltage and lightning protection. This can be retrofitted as an option.

Figure 7.8: Lightning and overvoltage protection system for protecting the AC feed-in system and the control voltage supply

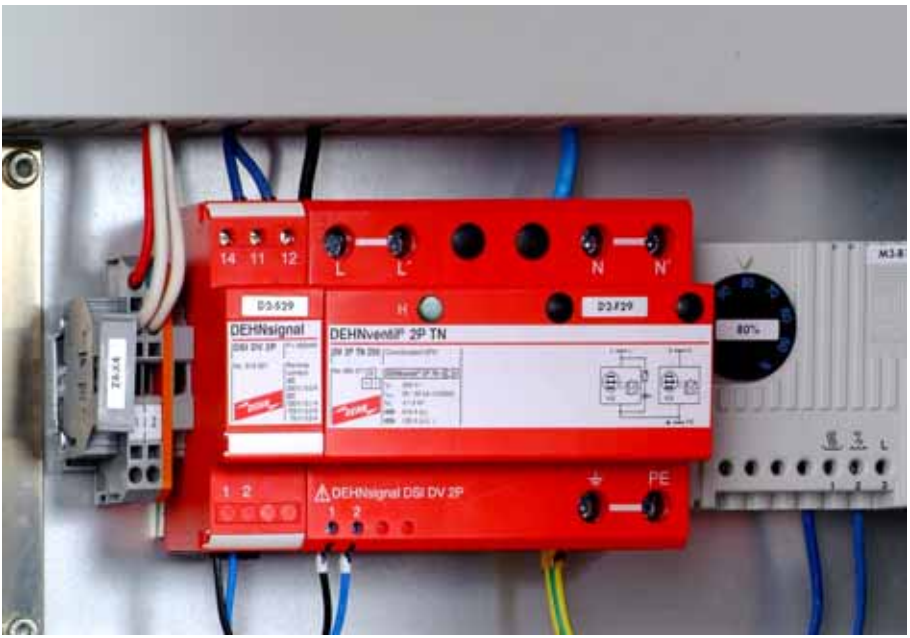


Figure 7.9: Overvoltage protection system for protecting the DC inputs

We also recommend an optimum protection level at the grid connection point by installing combined overvoltage and lightning protection there as well.

The analog input of the external temperature sensor and both additional analog signal inputs are not equipped with lightning and overvoltage protection as a standard feature. This can be retrofitted as an option.

Before measuring the insulation, the overvoltage protectors must be removed or disconnected or the existing fuses must be removed!

We recommend using lightning and overvoltage protection for the external temperature sensor and for *both of the available analog inputs. This can be ordered as an option.*

When an external control voltage supply cable is connected, the lightning and overvoltage protection at this voltage input is rendered useless! We therefore recommend the option of retrofitting the device with combined lightning and overvoltage protection!

The grid structure, in particular the special feature of the TT grid must be observed.

7.1.9 PV Generator Power Connection (DC Connection)

A busbar that allows string distribution boxes to be connected is located in the left lower area of the inverter sidewall. Cables rated for a minimum of 900 V are required for connecting the DC cables to the fuse inputs of the inverter. The voltage resistance must be at least 1000 V for inverters that are equipped with an optional EVR. The SC100 is equipped with 3 DC inputs (see data sheet **Appendix B**).

The cables are fed through the socket and the base of the cabinet. To do this, the base plates in the front of the cabinet are opened and the cable pulled into the inside of the cabinet. Suitable cable screw connections must be installed in the removable base plates to provide strain relief for the cable. A variety of threaded joint sizes is provided for this purpose.

*The DC cables are connected directly to the busbar using M12 cable lugs. See the electrical connection section in the table located in **Appendix C**.*

The DC cables to be connected must be rated for a minimum of 900 V. They must have a voltage resistance of at least 1000 V for an optional EVR.

The DC voltage of the PV generator must never exceed the maximum permissible inverter input voltage.

Otherwise the inverter is in acute danger when connected! U_{PV} < 900 / 1000 V!

All cable feeds and base plates must be locked tightly so that no small animals can enter the device!

Since the Sunny Central is not equipped with a fuse, the DC cables to be connected must be designed for at least 2/3 of the maximum generator current rating.

Figure 7.5: View of the DC connection area

8 Commissioning

Before starting the device for the first time (commissioning), all work performed on the device should be thoroughly checked. In particular, the voltages on the DC and AC sides should be checked for conformance with the limits allowed on the inverter.

8.1 Prerequisites

To allow the inverter to be correctly commissioned, the following conditions must be satisfied in advance before the device is put into operation.

The PV generator must be constructed and tested in compliance with to VDE 0100 part 610 BGV A2 "Electrical Systems and Appliances". The grounding resistance is decisive for the safety of the complete system and must therefore be determined before the system is started for the first time.

When delivered, all circuit beakers and motor overload switches in the Sunny Central are switched off.

8.2 Cabling Checks

When performing the cabling checks, the connections are first checked for correctness and proper installation.

AC Grid Connection

The connection made to the feed-in cables is 3-phase. It must be checked that the inverter is connected to the correct grid connection type (TN-C, TN-S or TT) and that a right-hand rotary field exists on L1, L2 and L3. The level of the AC voltage should be measured and logged. The Sunny Central feeds into the grid using 3 x 400 V (+/- 10 %).

AC Control Voltage Connection (Optional)

The connection made to the feed-in cables is 1-phase. Have the bridges in the connection terminal strip been removed and has a separate supply cable been connected for the external AC control voltage? Has the external AC control voltage been connected to the correct grid connection type (TN-S)?

DC Power Connections

The DC power connections are made over the main DC cables to the inverter. The voltage on the individual DC main cables should be almost identical and must never exceed the maximum DC voltage of the inverter.

In addition to the voltage levels, the polarity of the individual DC main cables must also be checked. The wrong polarity in one of the DC main cables can also damage the PV generator. Again, all DC connections should be checked to ensure that they are mechanically tight.

Serial Interfaces

For external communication and string current monitoring, the data cables must be connected.

Settings for the Hygrostat

The device contains an adjustable hygrostat for controlling the cabinet ventilators and the overheating shut-off system. The hygrostat is pre-adjusted before delivery.

Prior to commissioning, please check whether the settings agree with the information in the wiring diagram. If deviations are found, please set the values specified in the wiring diagram.

8.3 Switch On

If all tests and measurements have been performed, and all measured values lie within the acceptable range, then the device can be switched on for the first time.

All circuit breakers and motor overload switches in the Sunny Central are to be switched on.

Now the inverter is completely connected on the AC and DC sides and can be switched on using the key switch. Close the cabinet doors and turn the key switch to the right to the "Start" position.

The Sunny Central will now start automatically. First, the grid voltage and frequency parameters are checked. After approx. 20 seconds, the motorized DC breaker is activated automatically and connects the PV generator.

Please follow the Sunny Central user manual for the continued operation of the inverter.

9 Appendix A

Notes on Transporting Sunny Central Inverters (SC 100 outdoor / indoor)

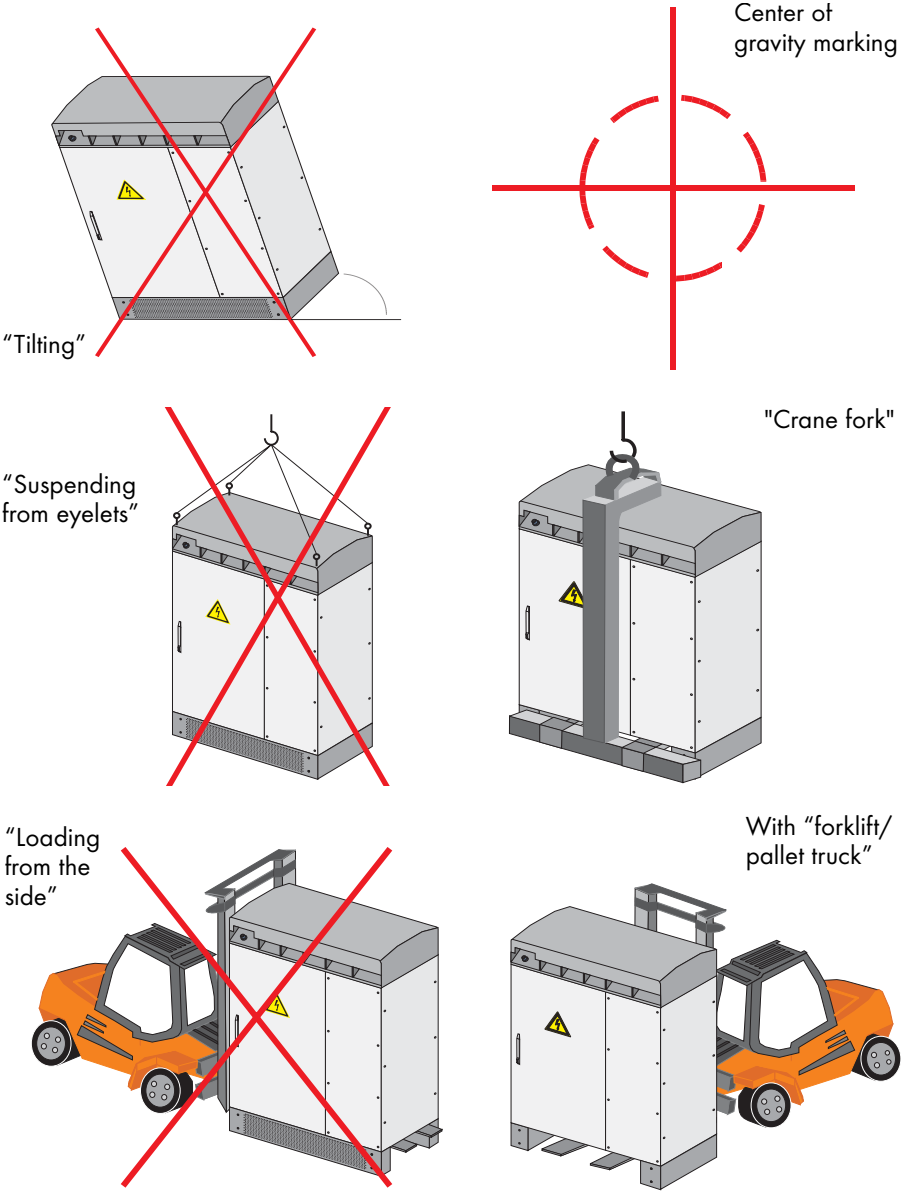
The aim: to avoid damage or accidents during transport by the shipping company and on the construction site.

The following measures have been introduced to achieve this aim:

- For delivering SC central inverters, all shipping companies have generally agreed not to transfer the cabinets between transporters.
- After being packed, all cabinets shall be labeled on the front and rear sides with the international center of gravity symbol (see figure A). The symbols shall be sprayed on using a stencil.
- In addition, transport instructions shall be affixed to the inverter (see figure A). The transport markings stipulate that forklift or pallet trucks must always load the switch cabinets by their long sides (front and rear sides of the SC). It is forbidden to lift them by their short sides.
- Transport by crane is allowed if a suitable crane fork is used that is pushed through the openings in the base of the switch cabinet (figure A).
- Transporing them using the eyelets on the top of the cabinet is not allowed (SC specific, see overview table).
- The manufacturers shall ensure that “high quality” pallets are used.
- The cabinets must not be tilted.

Figure A: Transport instructions for Sunny Central (SC) inverters

Forbidden **Permitted and must be observed**



10 Appendix B Technical Data

Sunny Central data	Symbol	SC100 outdoor
Input data		
Max. PV power (recommended)	P_{PV}	110 kWp [a)]
DC voltage range, MPPT	U_{DC}	450 - 820 V
Max. permissible DC voltage	$U_{DC, max}$	900 V / optional 1000 V
Max. permissible DC current	$I_{DC, max}$	235 A
Voltage ripple, PV voltage	U_{PP}	< 3 %
Number of DC inputs / terminal not secured		3 x positive (120 mm²) M12 screws 3 x negative (120 mm²) M12 screws
Output data		
Nominal AC output power	P_{AC}	100 kW
Operating grid voltage +/- 10 %	U_{AC}	400 V
Nominal AC current	I_{ACnom}	145 A
Grid structure		TT, TN-S, TN-C grid
Operating grid frequency	f_{AC}	50 Hz - 60 Hz
Harmonic distortion of grid current	K_{IAC}	< 3 % at nominal power output
Power factor	cos	0.99 at nominal power output
Efficiency per IEC61683		
10 % ; 25 % ; 50 % ; 75 % ; 100 % of P_{ACnom}	10, 25, 50, 75, 100	94,2 / 96,4 / 96,7 / 96,4 / 96,2 %
Euro ETA		96.2 %
Dimensions and weight		

Sunny Central data	Symbol	SC100 outdoor
Width x Height x Depth [mm]	W/H/D	1270 / 1850 / 870
Weight (approx.)	m	925 kg
Power consumption		
Operating consumption	P_{day}	< 1 % of P_{ACnom}
Standby operating consumption	P_{night}	< approx. 50 W
External auxiliary voltage / grid structure		optionally 230 V, 50/ 60 Hz TN-S grid
External back-up fuse for auxiliary supply		B 16 A, 1-pole
SCC (Sunny Central Control) interfaces		
Communication (optional)		Analog, ISDN, Ethernet, GSM
Analog inputs		optionally1x Pt100, 2x A_{in} b)
Overvoltage protection for analog inputs		optional
Sunny String Monitor interface	COM1	RS485
PC interface	COM3	RS232
Voltage-free contact (ext. failure)		1
Features		
Cabinet color		roof + base RAL 7024 housing 9022
Display	SCC	yes
Ground fault monitoring		yes (optional)
Heating		yes
Emergency stop		no
Power switch AC side		yes
Power switch DC side		motor-driven
Monitored overvoltage protectors AC		optional
Monitored overvoltage protectors DC		yes

Sunny Central data	Symbol	SC100 outdoor
Monitored overvoltage protectors for auxiliary supply		optional
Standards		
EMC		EN 61000-6-2, EN 61000-6-4
Grid monitoring		per VDEW regulations
CE conformity		yes
Protection rating and ambient conditions		
Protection rating per EN 60529		IP44 / IP54
Permissible ambient temperature	T	-20 °C ... +50 °C[c]
Relative humidity, not condensing	U_{air}	15 ... 95 %
Max. altitude (above sea level)	NN	1,000 m
Air quality (minimum requirements) per EN 60721-3-3		class 3S2
Fresh air consumption	V_{air}	2,300 m³/h
Air duct for outdoor installation		drawn through roof blown out through base

a. Specifications apply to irradiation values = 1000 $\frac{kWh}{kWp \cdot Year}$

b. Terminal for an analog sensor provided by the customer in two-wire systems

c. Compliance with nominal values up to an ambient temperature of +40 °C, with an ambient temparature of +50 °C maintanance of the nominal values up to two houres

Please note:

- the "Sunny Central Transport Instructions",
- the "Sunny Central Installation Guide",
- when installing the SC 100 Outdoor, a suitable foundation, sufficient ventilation and appropriate sun shading systems are necessary

SC100 indoor Technical Data

Sunny Central data	Symbol	SC100 indoor
Input data		
Max. PV power (recommended)	P_{PV}	110 kWp [a)]
DC voltage range, MPPT	U_{DC}	450 - 820 V
Max. permissible DC voltage	$U_{DC, max}$	900 V / optional 1000 V
Max. permissible DC current	$I_{DC, max}$	235 A
Voltage ripple, PV voltage	U_{PP}	< 3 %
Number of DC inputs / terminal not secured		3 x positive (120 mm²) M12 screws 3 x negative (120 mm²) M12 screws
Output data		
Nominal AC output power	P_{AC}	100 kW
Operating grid voltage +/- 10 %	U_{AC}	400 V
Nominal AC current	I_{ACnom}	145 A
Grid structure		TT, TN-S, TN-C grid
Operating grid frequency	f_{AC}	50 Hz - 60 Hz
Harmonic distortion of grid current	K_{IAC}	< 3 % at nominal power output
Power factor	cos	0.99 at nominal power output
Efficiency per IEC61683		
10 % ; 25 % ; 50 % ; 75 % ; 100 % of P_{ACnom}	10, 25, 50, 75, 100	94.2 / 96.4 / 96.7 / 96.4 / 96.2 %
Euro ETA		96.2 %
Dimensions and weight		

Sunny Central data	Symbol	SC100 indoor
Width x Height x Depth [mm]	W/H/D	1270 / 1610 / 805
Weight (approx.)	m	925 kg
Power consumption		
Operating consumption	P_{day}	< 1 % of P_{ACnom}
Standby operating consumption	P_{night}	< approx. 50 W
External auxiliary voltage / grid structure		optionally 230 V, 50/ 60 Hz TN-S grid
External back-up fuse for auxiliary supply		B 16 A, 1-pole
SCC (Sunny Central Control) interfaces		
Communication (optional)		Analog, ISDN, Ethernet, GSM
Analog inputs		optionally1x Pt100, 2x A_{in} b)
Overvoltage protection for analog inputs		optional
Sunny String Monitor interface	COM1	RS485
PC interface	COM3	RS232
Voltage-free contact (ext. failure)		1
Features		
Cabinet color		roof + base RAL 7024 housing 9022
Display	SCC	yes
Ground fault monitoring		yes (optional)
Heating		yes
Emergency stop		no
Power switch AC side		yes
Power switch DC side		motor-driven
Monitored overvoltage protectors AC		optional
Monitored overvoltage protectors DC		yes

Sunny Central data	Symbol	SC100 indoor
Monitored overvoltage protectors for auxiliary supply		optional
Standards		
EMC		EN 61000-6-2, EN 61000-6-4
Grid monitoring		per VDEW regulations
CE conformity		yes
Protection rating and ambient conditions		
Protection rating per EN 60529		IP21
Permissible ambient temperature	T	-20 °C ... +50 °C[c)]
Relative humidity, not condensing	U_{air}	15 ... 95 %
Max. altitude (above sea level)	NN	1,000 m
Air quality (minimum requirements) per EN 60721-3-3		class 3S2
Fresh air consumption	V_{air}	2,300 m³/h
Air duct for outdoor installation		drawn through roof blown out through roof

a. Specifications apply to irradiation values = 1000 $\frac{kWh}{kWp \cdot Jahr}$

b. Terminal for an analog sensor provided by the customer in two-wire systems

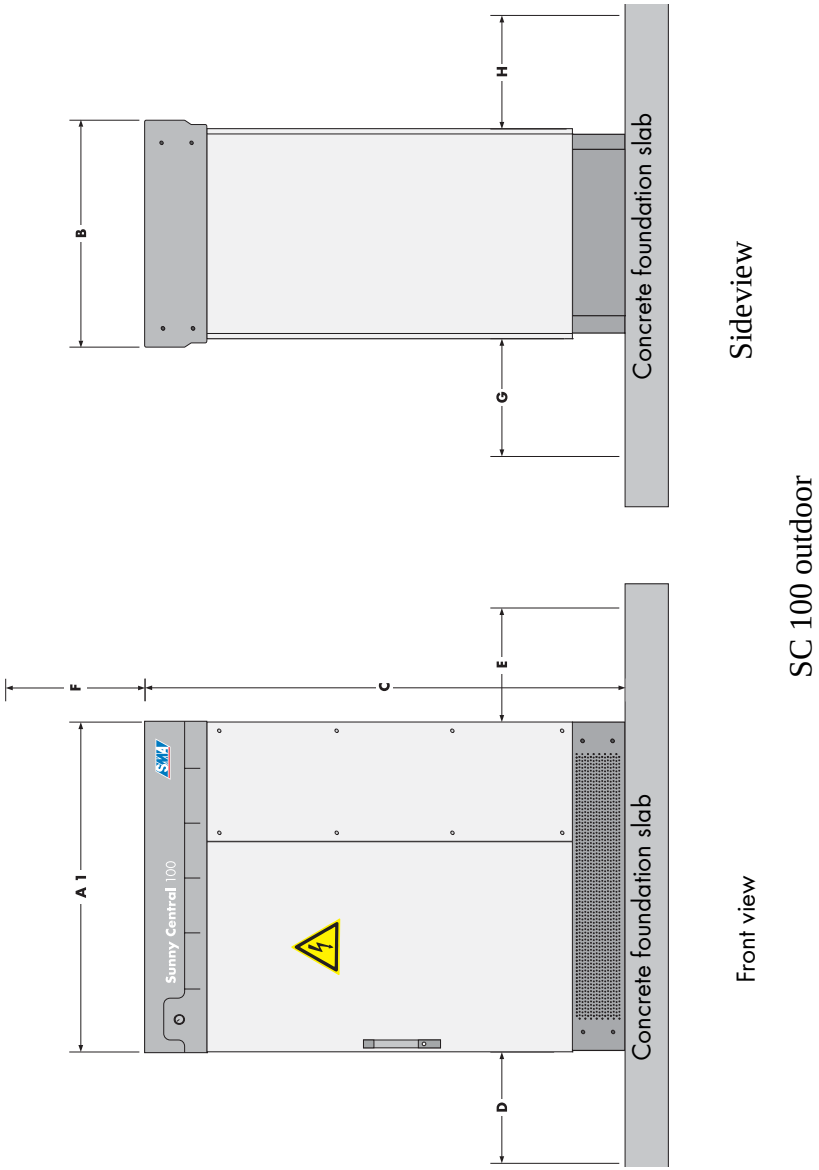
c. Compliance with nominal values up to an ambient temperature of +40 °C, with an ambient temparature of +50 °C maintanance of the nominal values up to two houres

Please note:

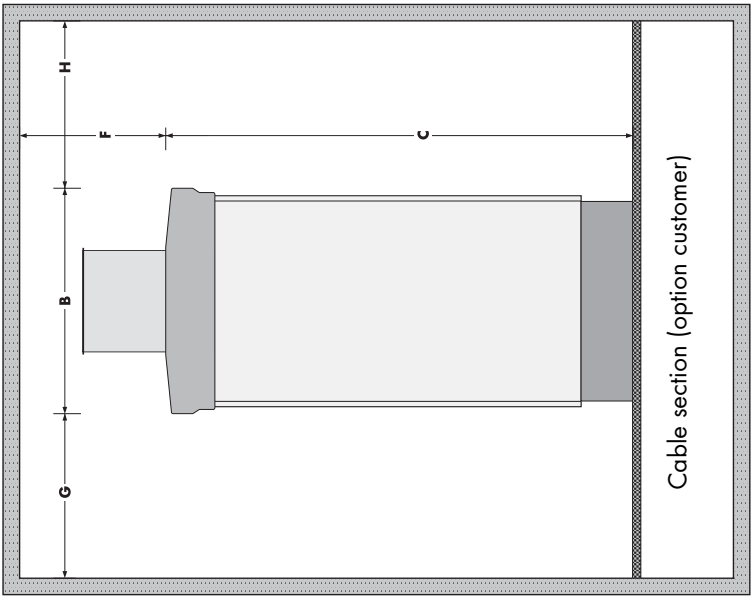
- the "Sunny Central Transport Instructions",
- the "Sunny Central Installation Guide",
- when installing the SC 100 Outdoor, a suitable foundation, sufficient ventilation and appropriate sun shading systems are necessary

11 Appendix C

Extract from the SC installation requirements
SC 100 Outdoor installation requirements

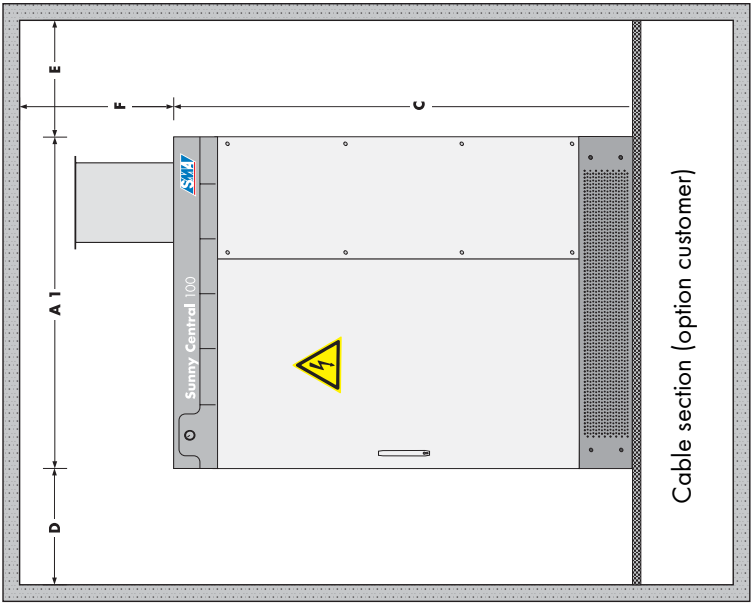


SC 100 Outdoor installation requirements



Sideview

SC 100 indoor



Front view

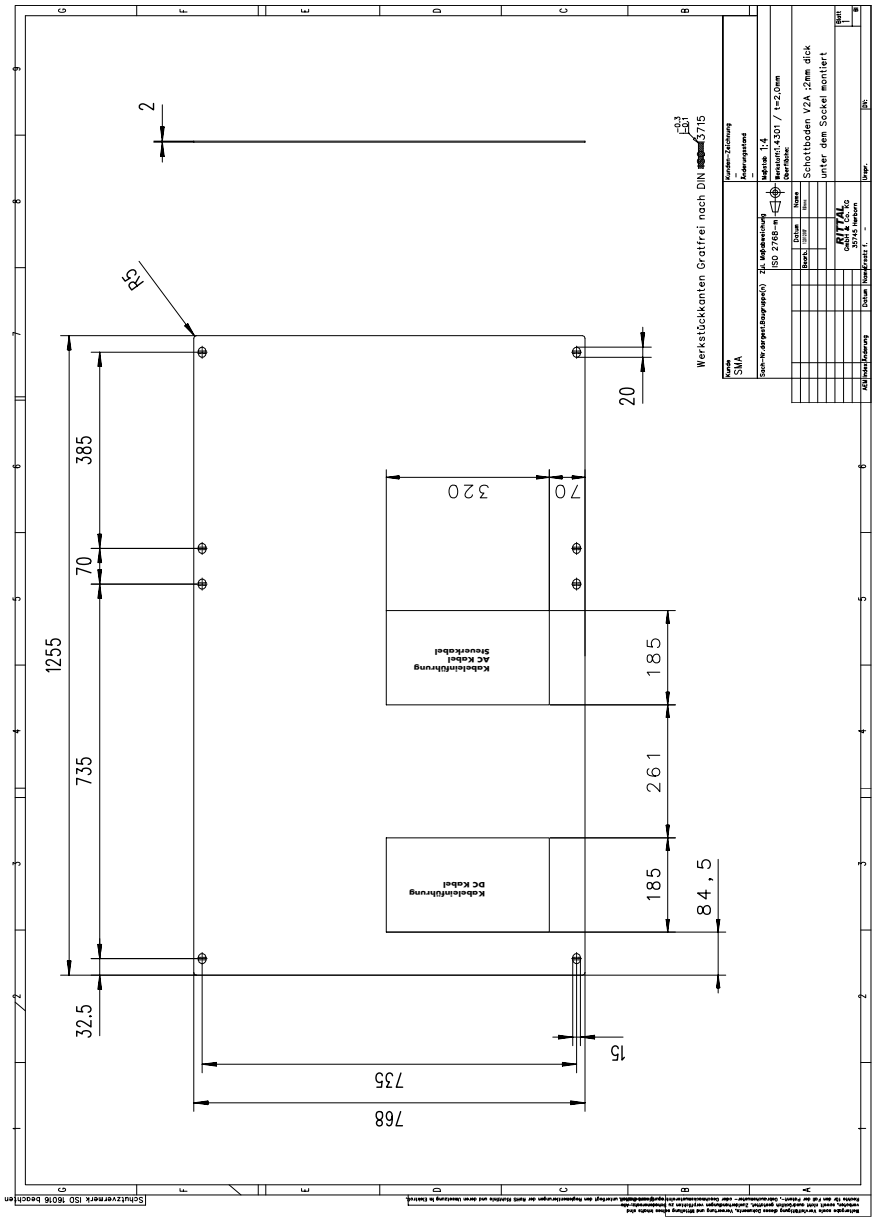
Version 4906			Size = Cabinet sizes without attached parts			Minimum Clearance					Weight	Fresh air consumption	Electrical connection	
Sunny Central			**Length A1**	**Width B**	**Height C**	**D**	**E**	**F**	**G**	**H**	**Total Weight**	**Total consumpt.**	**DC**	**AC**
			Maße = Schrankmaße ohne Anbauteile			**Mindestabstände**					**Gewichte**	**Luftvolumen**	**Elektrischer Anschluss**	
Sunny Central	**Luftauslass**	**air exhaust**	**Länge A1**	**Breite B**	**Höhe C**	**D**	**E**	**F**	**G**	**H**	**Gesamt-gewicht**	**Gesamt-volumen**	**DC**	**AC**
			mm	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**kg**	**m³/h**		
SC-100 Indoor	oben	Top	1270	805	1610	50	50	(1	50	850	925Kg	2300m³/h	M12(2	185mm²(3
SC-100 Outdoor	unten	Base	1270	870	1850	500	500	600	500	850	925Kg	2300m³/h	M12(2	185mm²(3

(1 in Abhängigkeit vom Lüftungssystem
(2 Schrauben
(3 Schraubklemme

(1 depending on the ventilation system
(2 screws
(3 screwterminal

12 Appendix D

Illustration of SC100 Outdoor Base Attachment



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